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EXAMINER	
CUTLER, ALBERT H	

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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/701,829	COOPER, J. CARL	
	Examiner	Art Unit	
	ALBERT H. CUTLER	2622	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *06 November 2008*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-23* is/are pending in the application.

4a) Of the above claim(s) *15 and 16* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-14 and 17-23* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)

2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.

4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .

5) ☐ Notice of Informal Patent Application

6) ☐ Other: _____.

DETAILED ACTION

1. This office action is responsive to communication filed on November 6, 2008. Claims 11-14 and 17-23 are pending in the application and have been examined by the Examiner. Claims 15 and 16 have been withdrawn from consideration.

Continued Examination Under 37 CFR 1.114

2. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on November 6, 2008 has been entered.

Response to Arguments

3. Applicant's arguments with respect to claims 11-14 and 17-23 have been considered but are moot in view of the new ground(s) of rejection.

Claim Rejections - 35 USC § 102

4. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

5. Claims 1-3, 6, 17, 19 and 20 are rejected under 35 U.S.C. 102(e) as being anticipated by Edwards (US 7,312,766).

Consider claim 1, Edwards teaches:

A digital imaging system (figure 1) comprising:

a. an image sensor (video camera, 11) and a separate display (Head Mounted Display, HMD, 1, and first computer, 7), wherein a sensing device to which said image sensor is coupled (i.e. video camera, 11) operates independently of a display device to which said separate display is coupled (The display (1, 7) is external from the sensing device (11), as shown in figure 1 and detailed in column 4, line 66 through column 5, line 12); said separate display being capable of rotating through at least one angle that is independent from the rotation of said image sensor (The HMD is connected to the head of a user, and as the image sensor (11) is not located on the head of the user, the HMD rotates independently from the camera, column 5, lines 9-15.);

b. an image sensor orientation sensor (The orientation of the camera is sensed and transmitted to the first computer (7) as camera position information, column 5, lines 51-60. This is shown in figure 1 as "pointing mechanism position corresponding to camera video image".); a display orientation sensor (3-axis head tracker, 3, column 5, lines 10-20); and

c. an image manipulator (first computer, 7, see figure 6), wherein the display device (1, 7) includes the image manipulator (7), which:

i) receives image sensor orientation (“capture position data”, “associated image and position data”, and “transmit data to first computer”, figure 6);

ii) receives display orientation (“provide HMD data position”, figure 6); and

iii) adjusts the image orientation (“transform image based on offset between HMD and camera", figure 6).

See also column 5, line 48 through column 6, line 9, column 7, lines 6-32.

Consider claim 3, and as applied to claim 1 above, Edwards further teaches that the digital imaging system is chosen from the group consisting of still cameras and video cameras (The camera is a video camera (11), see figure 1.).

Consider claim 6, and as applied to claim 1 above, Edwards further teaches that the image manipulator comprises an image rotation system (see figures 3d and 3e, column 6, lines 20-23).

Consider claim 2, Edwards teaches:

A digital imaging system comprising:

a. an image sensor for sensing an image subject and to capture a presentation of the image (video camera, 11); and a separate display device for displaying said presentation of said image (Head Mounted Display, HMD, 1, and first computer, 7), wherein a sensing device to which said image sensor is coupled (i.e. video camera, 11) operates independently of said separate display device (The display

(1, 7) is external from the sensing device (11), as shown in figure 1 and detailed in column 4, line 66 through column 5, line 12); said separate display being capable of rotating through at least one angle that is independent from the rotation of said image sensor (The HMD is connected to the head of a user, and as the image sensor (11) is not located on the head of the user, the HMD rotates independently from the camera, column 5, lines 9-15.);

b. an image sensor orientation sensor for sensing changes in the orientation of an image with respect to a first image sensor base line orientation coordinates (The orientation of the camera is sensed and transmitted to the first computer (7) as camera position information, column 5, lines 51-60. This is shown in figure 1 as “pointing mechanism position corresponding to camera video image”.); and a display orientation sensor for sensing changes in the orientation of said display device with respect to a second display device base line orientation coordinates (3-axis head tracker, 3, column 5, lines 10-20. The display orientation sensor senses changes in orientation with respect to the head of the user. As the display is remote from the camera, and the orientation of each respective device is sensed, the display and the camera have different baseline coordinates.); and

c. an image manipulator (first computer, 7, see figure 6), wherein the separate display device (1, 7) includes the image manipulator (7), which:

i) receives image sensor orientation from the image sensor orientation sensor (“capture position data”, “associated image and position data”, and “transmit data to first computer”, figure 6);

ii) receives display orientation from the display orientation sensor (“provide HMD data position”, figure 6); and

iii) adjusts the image orientation in relation to both the image sensor orientation and the display orientation to reconcile said different first and second baseline orientation coordinates (“transform image based on offset between HMD and camera", figure 6).

See also column 5, line 48 through column 6, line 9, column 7, lines 6-32.

Consider claim 17, Edwards teaches:

A display (Head Mounted Display, HMD, 1, and first computer, 7) for an image produced by an image sensor component (video camera, 1) of a digital imaging system (figure 1), wherein said image sensor (1) operates independently of a display device to which said display is coupled (The display (1, 7) is external from the sensing device (11), as shown in figure 1 and detailed in column 4, line 66 through column 5, line 12); and wherein said display being capable of rotating through at least one angle that is independent from the rotation of said image sensor (The HMD is connected to the head of a user, and as the image sensor (11) is not located on the head of the user, the HMD rotates independently from the camera, column 5, lines 9-15.); said display comprising

a. a display orientation sensor (3-axis head tracker, 3, column 5, lines 10-20);

b. means to received the orientation from the image sensor (The orientation of the camera is sensed and transmitted to the first computer (7) as camera position

information, column 5, lines 51-60. This is shown in figure 1 as “pointing mechanism position corresponding to camera video image”.);

c. an image manipulator (first computer, 7, see figure 6), which:

i) receives image sensor orientation (“capture position data”, “associated image and position data”, and “transmit data to first computer”, figure 6);

ii) receives display orientation (“provide HMD data position”, figure 6); and

iii) adjusts the image orientation (“transform image based on offset between HMD and camera", figure 6).

See also column 5, line 48 through column 6, line 9, column 7, lines 6-32.

Consider claim 19, and as applied to claim 17 above, Edwards further teaches that the display is chosen from the group consisting of mobile displays (As the display is head mounted ("Head Mounted Display"), it is considered mobile.).

Consider claim 20, and as applied to claim 17 above, Edwards further teaches that the image manipulator comprises an image rotation system (see figures 3d and 3e, column 6, lines 20-23).

Claim Rejections - 35 USC § 103

6. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the

invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

7. The factual inquiries set forth in *Graham* **v.** *John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

8. Claims 4, 7 and 8 are rejected under 35 U.S.C. 103(a) as being unpatentable over Edwards (US 7,312,766).

Consider claim 4, and as applied to claim 1 above, Edwards does not explicitly teach that the image sensor is a charge coupled device array.

However, **Official Notice** (MPEP § 2144.03) is taken that both the concepts and advantages of using a charge coupled device array image sensor in a digital camera are well known and expected in the art. It would have been obvious to a person having ordinary skill in the art at the time of the invention to us a charge coupled image sensor in the camera taught by Edwards for the benefit of enabling the recording of images with an excellent image quality and high dynamic range.

Consider claim 7, Edwards teaches:

A digital camera (video camera, 11, second computer, 15, figure 5) comprising:

b. an orientation sensor that detects the orientation of said digital camera relative to gravity (The orientation of the camera is sensed and provided to a computer (7, 15) as camera position information, column 5, lines 51-60, column 6, line 66 through column 7, line 3. Figure 3a shows a "nominal display of image", which image is clearly oriented relative to gravity.); and

c. means to receive the orientation relative to gravity (3-axis head tracker, 3, column 5, lines 10-20) of a display device (Head Mounted Display, HMD, 1, and first computer, 7) capable of displaying the image produced by said digital camera (see figures 3a-4d), wherein said display device (1, 7) operates independently of said digital camera (The display (1, 7) is external from the sensing device (11), as shown in figure 1 and detailed in column 4, line 66 through column 5, line 12);

d. at least one image manipulator (second computer, 15, column 6, line 66 through column 7, line 3.) which:

i) receives said digital camera orientation (“capture position data”, “associated image and position data”, and “transmit data to first computer”, figure 6);

ii) receives said display device orientation (“provide HMD data position”, figure 6); and

iii) transforms the image produced by said camera to reconcile differences relative to gravity between said orientation of said charge coupled device image sensor and said orientation of said display device (“transform image based on offset between HMD and camera", figure 6. Since the baseline for the display and camera orientations

is relative to gravity (figure 3a), the reconciliation between the HMD and camera is relative to gravity.).

See also column 5, line 48 through column 6, line 9, column 7, lines 6-32. In addition, note that column 6, lines 66-67 recites that the processing is performed either in the first computer (7, i.e. the display computer) or the second computer (15, i.e. the camera computer).

However, Edwards does not explicitly teach that the digital camera comprises a charge coupled device image sensor.

However, **Official Notice** (MPEP § 2144.03) is taken that both the concepts and advantages of using a charge coupled device image sensor in a digital camera are well known and expected in the art. It would have been obvious to a person having ordinary skill in the art at the time of the invention to us a charge coupled image sensor in the camera taught by Edwards for the benefit of enabling the recording of images with an excellent image quality and high dynamic range.

Consider claim 8, and as applied to claim 7 above, Edwards further teaches that the digital camera is chosen from the group consisting of still cameras and video cameras (The camera is a video camera (11), see figure 1.).

9. Claim 5, 9, 13(1), 13(2) and 14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Edwards in view of Thomas (US 6,781,623).

Consider claim 5, and as applied to claim 1 above, Edwards does not explicitly teach that either orientation sensor is chosen from the group consisting of electronic gyroscopic sensors, mechanical gyroscopic sensors, and optical gyroscopic sensors.

Thomas similarly teaches a digital imaging system (figures 5 and 6) comprising an image sensor (“CCD”, 16, figure 6, column 4, lines 38-41) and a separate display (12), an image sensor orientation sensor (“sensor”, 20, figure 6, column 4, lines 42-45), and at least one image manipulator (“Digital Signal Processor”, 36, figure 6, column 5 lines 18-24) adapted to receive image sensor orientation (See figure 6, the image sensor orientation is obtained by the frame memory (38), which is connected to the image sensor (16), and provided to the image manipulator (34), column 5, lines 15-22.), receive image orientation (See figure 6, the image orientation is obtained by the sensor (20) and provided to the image manipulator (34), column 5, lines 18-26.), and adjust the image orientation (The image manipulator (34) applies a rotational transform to the image, column 5, lines 18-26, figure 7, column 6, lines 33-46.).

However, in addition to the teachings of Edwards, Thomas teaches that the image sensor orientation sensor is chosen from the group consisting of mechanical gyroscope sensors (Thomas teaches that a mechanical gyroscope sensor can be used to apply a rotational transform and maintain an orientation which has been manually aligned, column 7, line 35 through column 8, line 19.).

Therefore, it would have been obvious to a person having ordinary skill in the art at the time of the invention to use a mechanical gyroscope sensor as taught by Thomas as the image orientation sensor taught by Edwards for the benefit of enabling the

detection of changes from a vertical alignment set manually by a professional cameraman (Thomas, column 8, lines 6-10).

Consider claim 9, and as applied to claim 7 above, Edwards does not explicitly teach that either orientation sensor is chosen from the group consisting of electronic gyroscopic sensors, mechanical gyroscopic sensors, and optical gyroscopic sensors.

Thomas similarly teaches a digital imaging system (figures 5 and 6) comprising an image sensor (“CCD”, 16, figure 6, column 4, lines 38-41) and a separate display (12), an image sensor orientation sensor (“sensor”, 20, figure 6, column 4, lines 42-45), and at least one image manipulator (“Digital Signal Processor”, 36, figure 6, column 5 lines 18-24) adapted to receive image sensor orientation (See figure 6, the image sensor orientation is obtained by the frame memory (38), which is connected to the image sensor (16), and provided to the image manipulator (34), column 5, lines 15-22.), receive image orientation (See figure 6, the image orientation is obtained by the sensor (20) and provided to the image manipulator (34), column 5, lines 18-26.), and adjust the image orientation (The image manipulator (34) applies a rotational transform to the image, column 5, lines 18-26, figure 7, column 6, lines 33-46.).

However, in addition to the teachings of Edwards, Thomas teaches that the image sensor orientation sensor is chosen from the group consisting of mechanical gyroscope sensors (Thomas teaches that a mechanical gyroscope sensor can be used to apply a rotational transform and maintain an orientation which has been manually aligned, column 7, line 35 through column 8, line 19.).

Therefore, it would have been obvious to a person having ordinary skill in the art at the time of the invention to use a mechanical gyroscope sensor as taught by Thomas as the image orientation sensor taught by Edwards for the benefit of enabling the detection of changes from a vertical alignment set manually by a professional cameraman (Thomas, column 8, lines 6-10).

Consider claim 13, and as applied to claim 1 above, Edwards does not explicitly teach of the type of orientation sensors used.

Thomas similarly teaches a digital imaging system (figures 5 and 6) comprising an image sensor (“CCD”, 16, figure 6, column 4, lines 38-41) and a separate display (12), an image sensor orientation sensor (“sensor”, 20, figure 6, column 4, lines 42-45), and at least one image manipulator (“Digital Signal Processor”, 36, figure 6, column 5 lines 18-24) adapted to receive image sensor orientation (See figure 6, the image sensor orientation is obtained by the frame memory (38), which is connected to the image sensor (16), and provided to the image manipulator (34), column 5, lines 15-22.), receive image orientation (See figure 6, the image orientation is obtained by the sensor (20) and provided to the image manipulator (34), column 5, lines 18-26.), and adjust the image orientation (The image manipulator (34) applies a rotational transform to the image, column 5, lines 18-26, figure 7, column 6, lines 33-46.).

However, in addition to the teachings of Edwards, Thomas teaches of using a mechanical gyroscope orientation sensor capable of sensing rotations in two dimensions (See column 8, lines 4-19. A mechanical gyroscope can be used to correct

the alignment of the video camera. The alignment is corrected in two dimensions, column 4, lines 42-62, figures 2-4.).

Therefore, it would have been obvious to a person having ordinary skill in the art at the time of the invention to use a mechanical gyroscope sensor as taught by Thomas as the image orientation sensor taught by Edwards for the benefit of enabling the detection of changes from a vertical alignment set manually by a professional cameraman (Thomas, column 8, lines 6-10).

Consider claim 13, and as applied to claim 2 above, Edwards does not explicitly teach of the type of orientation sensors used.

Thomas similarly teaches a digital imaging system (figures 5 and 6) comprising an image sensor (“CCD”, 16, figure 6, column 4, lines 38-41) and a separate display (12), an image sensor orientation sensor (“sensor”, 20, figure 6, column 4, lines 42-45), and at least one image manipulator (“Digital Signal Processor”, 36, figure 6, column 5 lines 18-24) adapted to receive image sensor orientation (See figure 6, the image sensor orientation is obtained by the frame memory (38), which is connected to the image sensor (16), and provided to the image manipulator (34), column 5, lines 15-22.), receive image orientation (See figure 6, the image orientation is obtained by the sensor (20) and provided to the image manipulator (34), column 5, lines 18-26.), and adjust the image orientation (The image manipulator (34) applies a rotational transform to the image, column 5, lines 18-26, figure 7, column 6, lines 33-46.).

However, in addition to the teachings of Edwards, Thomas teaches of using a mechanical gyroscope orientation sensor capable of sensing rotations in two dimensions (See column 8, lines 4-19. A mechanical gyroscope can be used to correct the alignment of the video camera. The alignment is corrected in two dimensions, column 4, lines 42-62, figures 2-4.).

Therefore, it would have been obvious to a person having ordinary skill in the art at the time of the invention to use a mechanical gyroscope sensor as taught by Thomas as the image orientation sensor taught by Edwards for the benefit of enabling the detection of changes from a vertical alignment set manually by a professional cameraman (Thomas, column 8, lines 6-10).

Consider claim 14, and as applied to claim 7 above, Edwards does not explicitly teach of the type of orientation sensors used.

Thomas similarly teaches a digital imaging system (figures 5 and 6) comprising an image sensor (“CCD”, 16, figure 6, column 4, lines 38-41) and a separate display (12), an image sensor orientation sensor (“sensor”, 20, figure 6, column 4, lines 42-45), and at least one image manipulator (“Digital Signal Processor”, 36, figure 6, column 5 lines 18-24) adapted to receive image sensor orientation (See figure 6, the image sensor orientation is obtained by the frame memory (38), which is connected to the image sensor (16), and provided to the image manipulator (34), column 5, lines 15-22.), receive image orientation (See figure 6, the image orientation is obtained by the sensor (20) and provided to the image manipulator (34), column 5, lines 18-26.), and adjust the

image orientation (The image manipulator (34) applies a rotational transform to the image, column 5, lines 18-26, figure 7, column 6, lines 33-46.).

However, in addition to the teachings of Edwards, Thomas teaches of using a mechanical gyroscope orientation sensor capable of sensing rotations in two dimensions (See column 8, lines 4-19. A mechanical gyroscope can be used to correct the alignment of the video camera. The alignment is corrected in two dimensions, column 4, lines 42-62, figures 2-4.).

Therefore, it would have been obvious to a person having ordinary skill in the art at the time of the invention to use a mechanical gyroscope sensor as taught by Thomas as the image orientation sensor taught by Edwards for the benefit of enabling the detection of changes from a vertical alignment set manually by a professional cameraman (Thomas, column 8, lines 6-10).

10. Claims 11(1), 11(2), 12 and 21 are rejected under 35 U.S.C. 103(a) as being unpatentable over Edwards as applied to claims 1, 2, 7 and 17 above, and further in view of Ahisha(US 2005/0007477) and Riconda et al.(US 2002/013093).

Consider claim 11, and as applied to claim 1 above, Edwards further teaches:

either of said orientation sensors produce three dimensional orientation information (pitch, yaw and roll, column 5, lines 12-14 and lines 57-60), and in which said three dimensional orientation information from either of said orientation sensors is used by said image manipulator to correct said image for perspective distortions that

result when the image sensor is located off of the perpendicular axis with respect to the plane of the image being sensed (Perspective distortion between the position of the HMD and the position of the camera is corrected, column 6, lines 6-23).

However, Edwards does not explicitly teach using the three dimensional orientation information to correct for keystone, barrel and other distortions that result when the image sensor is located off of the perpendicular axis with respect to the plane of the image being sensed.

Ahisha is similar to Edwards in that Ahisha teaches of a camera containing an image sensor (30) and an image processor (40, figure 1).

However, in addition to the teachings of Edwards, Akisha teaches using coordinate information to correct for barrel and other (i.e. pincushion) distortions (see figure 2) that result when the image sensor is located off of the perpendicular axis with respect to the plane of the image being sensed (See paragraphs 0021-0029, especially paragraphs 0024, and 0026-0029).

Therefore, it would have been obvious to a person having ordinary skill in the art at the time of the invention to use the coordinate information taught Edwards to correct for barrel and pincushion distortion as taught by Akisha for the benefit of improving perceived image quality.

The combination of Edwards and Akisha does not explicitly teach correcting for keystone distortion.

Riconda et al. similarly teach of a camera system for capturing and displaying images (see paragraphs 0062-0072, 0075).

However, in addition to the combined teachings of Edwards and Akisha, Riconda et al. teaches using coordinate information to correct for keystone distortions that result when the image sensor is located off of the perpendicular axis with respect to the plane of the image being sensed (paragraphs 0092-0103, figures 12A-12E, especially paragraph 0094).

Therefore, it would have been obvious to a person having ordinary skill in the art at the time of the invention to use the coordinate information taught by the combination of Edwards and Akisha to correct for keystone distortion as taught by Riconda et al. for the benefit of improving perceived image quality.

Consider claim 11, and as applied to claim 2 above, Edwards further teaches:

either of said orientation sensors produce three dimensional orientation information (pitch, yaw and roll, column 5, lines 12-14 and lines 57-60), and in which said three dimensional orientation information from either of said orientation sensors is used by said image manipulator to correct said image for perspective distortions that result when the image sensor is located off of the perpendicular axis with respect to the plane of the image being sensed (Perspective distortion between the position of the HMD and the position of the camera is corrected, column 6, lines 6-23).

However, Edwards does not explicitly teach using the three dimensional orientation information to correct for keystone, barrel and other distortions that result when the image sensor is located off of the perpendicular axis with respect to the plane of the image being sensed.

Ahisha is similar to Edwards in that Ahisha teaches of a camera containing an image sensor (30) and an image processor (40, figure 1).

However, in addition to the teachings of Edwards, Akisha teaches using coordinate information to correct for barrel and other (i.e. pincushion) distortions (see figure 2) that result when the image sensor is located off of the perpendicular axis with respect to the plane of the image being sensed (See paragraphs 0021-0029, especially paragraphs 0024, and 0026-0029).

Therefore, it would have been obvious to a person having ordinary skill in the art at the time of the invention to use the coordinate information taught Edwards to correct for barrel and pincushion distortion as taught by Akisha for the benefit of improving perceived image quality.

The combination of Edwards and Akisha does not explicitly teach correcting for keystone distortion.

Riconda et al. similarly teach of a camera system for capturing and displaying images (see paragraphs 0062-0072, 0075).

However, in addition to the combined teachings of Edwards and Akisha, Riconda et al. teaches using coordinate information to correct for keystone distortions that result when the image sensor is located off of the perpendicular axis with respect to the plane of the image being sensed (paragraphs 0092-0103, figures 12A-12E, especially paragraph 0094).

Therefore, it would have been obvious to a person having ordinary skill in the art at the time of the invention to use the coordinate information taught by the combination

of Edwards and Akisha to correct for keystone distortion as taught by Riconda et al. for the benefit of improving perceived image quality.

Consider claim 12, and as applied to claim 7 above, Edwards further teaches:

both of said orientation sensors produce three dimensional orientation information (pitch, yaw and roll, column 5, lines 12-14 and lines 57-60), and in which said three dimensional orientation information from both of said orientation sensors is used by said image manipulator to correct said image for perspective distortions that result when the image sensor is located off of the perpendicular axis with respect to the plane of the image being sensed (Perspective distortion between the position of the HMD and the position of the camera is corrected, column 6, lines 6-23).

However, Edwards does not explicitly teach using the three dimensional orientation information to correct for keystone, barrel and other distortions that result when the image sensor is located off of the perpendicular axis with respect to the plane of the image being sensed.

Ahisha is similar to Edwards in that Ahisha teaches of a camera containing an image sensor (30) and an image processor (40, figure 1).

However, in addition to the teachings of Edwards, Akisha teaches using coordinate information to correct for barrel and other (i.e. pincushion) distortions (see figure 2) that result when the image sensor is located off of the perpendicular axis with respect to the plane of the image being sensed (See paragraphs 0021-0029, especially paragraphs 0024, and 0026-0029).

Therefore, it would have been obvious to a person having ordinary skill in the art at the time of the invention to use the coordinate information taught Edwards to correct for barrel and pincushion distortion as taught by Akisha for the benefit of improving perceived image quality.

The combination of Edwards and Akisha does not explicitly teach correcting for keystone distortion.

Riconda et al. similarly teach of a camera system for capturing and displaying images (see paragraphs 0062-0072, 0075).

However, in addition to the combined teachings of Edwards and Akisha, Riconda et al. teaches using coordinate information to correct for keystone distortions that result when the image sensor is located off of the perpendicular axis with respect to the plane of the image being sensed (paragraphs 0092-0103, figures 12A-12E, especially paragraph 0094).

Therefore, it would have been obvious to a person having ordinary skill in the art at the time of the invention to use the coordinate information taught by the combination of Edwards and Akisha to correct for keystone distortion as taught by Riconda et al. for the benefit of improving perceived image quality.

Consider claim 21, and as applied to claim 17 above, Edwards further teaches:

both of said orientation sensors produce three dimensional orientation information (pitch, yaw and roll, column 5, lines 12-14 and lines 57-60), and in which said three dimensional orientation information from both of said orientation sensors is

used by said image manipulator to correct said image for perspective distortions that result when the image sensor is located off of the perpendicular axis with respect to the plane of the image being sensed (Perspective distortion between the position of the HMD and the position of the camera is corrected, column 6, lines 6-23).

However, Edwards does not explicitly teach using the three dimensional orientation information to correct for keystone, barrel and other distortions that result when the image sensor is located off of the perpendicular axis with respect to the plane of the image being sensed.

Ahisha is similar to Edwards in that Ahisha teaches of a camera containing an image sensor (30) and an image processor (40, figure 1).

However, in addition to the teachings of Edwards, Akisha teaches using coordinate information to correct for barrel and other (i.e. pincushion) distortions (see figure 2) that result when the image sensor is located off of the perpendicular axis with respect to the plane of the image being sensed (See paragraphs 0021-0029, especially paragraphs 0024, and 0026-0029).

Therefore, it would have been obvious to a person having ordinary skill in the art at the time of the invention to use the coordinate information taught Edwards to correct for barrel and pincushion distortion as taught by Akisha for the benefit of improving perceived image quality.

The combination of Edwards and Akisha does not explicitly teach correcting for keystone distortion.

Riconda et al. similarly teach of a camera system for capturing and displaying images (see paragraphs 0062-0072, 0075).

However, in addition to the combined teachings of Edwards and Akisha, Riconda et al. teaches using coordinate information to correct for keystone distortions that result when the image sensor is located off of the perpendicular axis with respect to the plane of the image being sensed (paragraphs 0092-0103, figures 12A-12E, especially paragraph 0094).

Therefore, it would have been obvious to a person having ordinary skill in the art at the time of the invention to use the coordinate information taught by the combination of Edwards and Akisha to correct for keystone distortion as taught by Riconda et al. for the benefit of improving perceived image quality.

11. Claims 10 and 18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Edwards as applied to claims 7 and 17 above, and further in view of Harrison (US 6,597,384).

Consider claim 10, and as applied to claim 7 above, Edwards does not explicitly teach of manually entering orientation information.

Harrison is similar Edwards in that Harrison teaches a mobile display device (figures 1a and 1b).

However, in addition to the teachings of Edwards, Harrison teaches that touch sensors (100, 102, 104, 106) are used to manually enter the display orientation (figure 3).

Therefore, it would have been obvious to a person having ordinary skill in the art at the time of the invention to manually enter display orientation information as taught by Harrison in the digital camera taught by Edwards for the benefit that the user can obtain the correct image orientation when the displayed image orientation is incorrect (Harrison, column 2, lines 38-39).

Consider claim 18, and as applied to claim 17 above, Edwards does not explicitly teach of manually entering orientation information.

Harrison is similar Edwards in that Harrison teaches a mobile display device (figures 1a and 1b).

However, in addition to the teachings of Edwards, Harrison teaches that touch sensors (100, 102, 104, 106) are used to manually enter the display orientation (figure 3).

Therefore, it would have been obvious to a person having ordinary skill in the art at the time of the invention to manually enter display orientation information as taught by Harrison of the digital camera taught by Edwards for the benefit that the user can obtain the correct image orientation when the displayed image orientation is incorrect (Harrison, column 2, lines 38-39).

12. Claim 22 is rejected under 35 U.S.C. 103(a) as being unpatentable over Edwards in view of Hinckley et al. (US 7,289,102).

Consider claim 22, and as applied to claim 17 above, Edwards does not explicitly teach the type of display orientation sensor used.

Hinckley et al. is similar to Edwards in that Hinckley et al. teaches of a portable device (figure 3) having a display (304) and an orientation sensor (308, column 4, lines 16-38). Hinckley et al. teach that the portable device receives image data from an outside source (column 2, lines 31-37, column 2, line 61 through column 3, line 3, column 9, lines 24-33).

However, in addition to the teachings of Edwards, Hinckley et al. teaches that the display orientation sensor can consist of an electronic gyroscope sensor (column 5, lines 2-3).

Therefore, it would have been obvious to a person having ordinary skill in the art at the time of the invention to have the display orientation sensor taught by Edwards consist of an electronic gyroscope sensor as taught by Hinckley et al. for the benefit of expanding the functionality of the display without requiring any user interaction (Hinckley et al., column 1, lines 38-44).

13. Claim 23 is rejected under 35 U.S.C. 103(a) as being unpatentable over Edwards in view of Hinckley et al. and Thomas.

Consider claim 23, and as applied to claim 17 above, Edwards does not explicitly teach the type of display orientation sensor used.

Hinckley et al. is similar to Edwards in that Hinckley et al. teaches of a portable device (figure 3) having a display (304) and an orientation sensor (308, column 4, lines 16-38). Hinckley et al. teach that the portable device receives image data from an outside source (column 2, lines 31-37, column 2, line 61 through column 3, line 3, column 9, lines 24-33).

However, in addition to the teachings of Edwards, Hinckley et al. teaches that the display orientation sensor can consist of an electronic gyroscope sensor (column 5, lines 2-3).

Therefore, it would have been obvious to a person having ordinary skill in the art at the time of the invention to have the display orientation sensor taught by Edwards consist of an electronic gyroscope sensor as taught by Hinckley et al. for the benefit of expanding the functionality of the display without requiring any user interaction (Hinckley et al., column 1, lines 38-44).

However, Hinckley does not explicitly teach that said gyroscope works in two or three dimensions.

Thomas similarly teaches a digital imaging system (figures 5 and 6) comprising an image sensor (“CCD”, 16, figure 6, column 4, lines 38-41) and a separate display (12), an image sensor orientation sensor (“sensor”, 20, figure 6, column 4, lines 42-45), and at least one image manipulator (“Digital Signal Processor”, 36, figure 6, column 5 lines 18-24) adapted to receive image sensor orientation (See figure 6, the image

sensor orientation is obtained by the frame memory (38), which is connected to the image sensor (16), and provided to the image manipulator (34), column 5, lines 15-22.), receive image orientation (See figure 6, the image orientation is obtained by the sensor (20) and provided to the image manipulator (34), column 5, lines 18-26.), and adjust the image orientation (The image manipulator (34) applies a rotational transform to the image, column 5, lines 18-26, figure 7, column 6, lines 33-46.).

However, in addition to the teachings of Edwards and Hinckley et al., Thomas teaches that a mechanical gyroscope orientation sensor capable of sensing rotations in two dimensions can be used as an orientation sensor (See column 8, lines 4-19. A mechanical gyroscope can be used to correct the alignment of the video camera. The alignment is corrected in two dimensions, column 4, lines 42-62, figures 2-4).

Therefore, it would have been obvious to a person having ordinary skill in the art at the time of the invention to use a mechanical gyroscope sensor as taught by Thomas as the orientation sensor taught by the combination of Edwards and Hinckley et al. for the benefit of enabling the detection of changes from a vertical alignment set manually by a professional cameraman (Thomas, column 8, lines 6-10).

Conclusion

14. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

15. Battles et al. (US 2005/0083417) teaches of sensing a camera orientation, incorporating that orientation into captured images, transmitting the captured images

and orientation information to an external display, and displaying the images according to the orientation information (see figures 6 and 7).

Any inquiry concerning this communication or earlier communications from the examiner should be directed to ALBERT H. CUTLER whose telephone number is (571)270-1460. The examiner can normally be reached on Mon-Thu (9:00-5:00).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Sinh Tran can be reached on (571) 272-7564. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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AC

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